Predictors of Earnings Risk with Machine Learning

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Abstract

This paper looks at the determinants of lifetime earnings risk under a Restricted Income Profile (RIP) model using traditional and machine learning methods such as lasso and SHAP values. The paper builds on the work of Drewianka and Oberg (2025) which uses a moment condition approach derive a parameter that captures permanent income risk. The paper finds that education and age are important in explaining lifetime earnings risk. The paper also finds that macroeconomic variables such as probability of recession and real GDP growth are important and along with state controls may further imply a role of government policy. Finally, the paper finds that occupation controls are important while industry controls do not appear to play a strong role.

Keywords: machine learning, restricted income profile, earnings instability, risk
JEL Codes: D8, J0, D3

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Table 1: Your Table Title Here

	(1) gammaP_WEIGHTED	(2) gammaP_WEIGHTED	(3) gammaP_WEIG
EDU1	-0.00950*	-0.00719	-0.00542
	(0.00407)	(0.00437)	(0.00485)
EDU2	-0.00632*	-0.00591*	-0.00506
	(0.00259)	(0.00269)	(0.00294)
EDU3	-0.00278	-0.00277	-0.00186
	(0.00296)	(0.00304)	(0.00323)
Probability of Recession	0.0000411	-0.00207	-0.0962
	(0.0000842)	(247.5)	(0.0528)
Real GDP growth rate	0.000553	-0.0130	-0.0137
	(0.000719)	(19.13)	(0.00703)
5-year moving average of AEP	0.0000266	0.000000171	-0.0000025
	(0.0000548)	(0.0000595)	(0.0000654
veteran	-0.00281	-0.00341	-0.00610
	(0.00436)	(0.00447)	(0.00649)
=1 if out of labor force (inc retired)	-0.0101	-0.00862	-0.0227
	(0.00848)	(0.00853)	(0.0142)
tenure	0.0000614	0.000140	0.000202
	(0.000151)	(0.000162)	(0.000164
age (consistent across years)	0.00592	0.00559	0.00559
	(0.00491)	(0.00504)	(0.00558)
currentage squared	-0.000160	-0.000169	-0.000172
	(0.000116)	(0.000119)	(0.000130
currentage cubed	0.00000140	0.00000150	0.0000015
	(0.000000886)	(0.000000906)	(0.0000009
State FE	No	Yes	Yes
Year FE	No	Yes	Yes
Race FE	No	Yes	Yes
Cohort FE	No	Yes	Yes
Occupation FE	No	No	No
Industry FE	No	No	Yes
R-squared	0.001	0.004	0.009
N	25920	25913	20954

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 2: Your Table Title Here

	(1) alphaP_WEIGHTED	(2) alphaP_WEIGHTED	(3) alphaP_WEIGHTE
EDU1	-0.0442***	-0.0342***	-0.0299**
	(0.00889)	(0.00954)	(0.0108)
EDU2	-0.0387***	-0.0364***	-0.0341***
	(0.00580)	(0.00600)	(0.00664)
EDU3	-0.0234***	-0.0242***	-0.0184*
	(0.00666)	(0.00681)	(0.00732)
Probability of Recession	-0.0000102	-0.0449	0.00151
	(0.000185)	(0.167)	(664.2)
Real GDP growth rate	-0.00108	-0.00306	0.0169
	(0.00158)	(0.0135)	(5.775)
5-year moving average of AEP	0.00142***	0.00153***	0.00129***
	(0.000119)	(0.000129)	(0.000144)
veteran	-0.0124	-0.0122	-0.00408
	(0.00920)	(0.00941)	(0.0146)
=1 if out of labor force (inc retired)	0.122***	0.123***	0.0984***
	(0.0165)	(0.0165)	(0.0289)
tenure	-0.000825*	-0.0000632	-0.00000483
	(0.000330)	(0.000355)	(0.000365)
age (consistent across years)	0.0158	0.0186	0.00916
	(0.00985)	(0.0101)	(0.0115)
currentage squared	-0.000433	-0.000533*	-0.000283
	(0.000229)	(0.000233)	(0.000263)
currentage cubed	0.00000394*	0.00000477**	0.00000278
	(0.00000171)	(0.00000175)	(0.00000195)
State FE	No	Yes	Yes
Year FE	No	Yes	Yes
Race FE	No	Yes	Yes
Cohort FE	No	Yes	Yes
Occupation FE	No	No	No
Industry FE	No	No	Yes
R-squared	0.013	0.019	0.029
N	32567	32556	25592

Standard errors in parentheses

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Table 3: Your Table Title Here

	(1) gammaP_WEIGHTED	(2) gammaP_WEIGHTED	(3) gammaP_WEIGHTED
EDU1	-0.00768*	-0.00769*	
	(0.00363)	(0.00364)	
EDU2	-0.00489*	-0.00494*	
	(0.00212)	(0.00212)	
currentage cubed	0.000000364*	0.000000367*	0.000000449**
	(0.000000145)	(0.000000145)	(0.000000157)
currentage squared	-0.0000222*	-0.0000225*	-0.0000287**
	(0.00000985)	(0.00000985)	(0.0000108)
twoind==Agric.,Forestry			0.00842
			(0.00809)
twoind==Fisheries			0.0586
			(0.0390)
twoind==Energy/Water			-0.00287
			(0.00645)
twoind==Mining			0.0229
			(0.0120)
twoind==Chemicals			-0.00639
			(0.00835)
twoind==Synthetics			0.00519
			(0.0103)
twoind==Earth/Clay/Stone			-0.00334
			(0.0125)
twoind==Iron/Steel			0.00161
			(0.00701)
twoind==Mechanical Eng			-0.00333
			(0.00478)
twoind==Electrical Eng			0.00223
			(0.00617)
twoind==Wood/Paper/Print			0.00387
			(0.00593)
twoind==Clothing/Text			-0.00593
			(0.00839)
twoind==Food Industry			0.00551

Table 4: Your Table Title Here

	(1) alphaP_WEIGHTED	(2) alphaP_WEIGHTED	(3) alphaP_WEIGHTE
EDU1	-0.0456***	-0.0350***	-0.0308**
	(0.00877)	(0.00947)	(0.0107)
EDU2	-0.0395***	-0.0374***	-0.0346***
	(0.00578)	(0.00596)	(0.00657)
EDU3	-0.0237***	-0.0255***	-0.0185*
	(0.00665)	(0.00677)	(0.00725)
currentage cubed	0.00000131***	0.00000176***	0.00000119***
	(0.000000303)	(0.000000329)	(0.000000338)
currentage squared	-0.0000734***	-0.000119***	-0.0000686**
	(0.0000212)	(0.0000248)	(0.0000239)
5-year moving average of AEP	0.00146***	0.00152***	0.00127***
	(0.000115)	(0.000121)	(0.000139)
tenure	-0.000824*		
	(0.000329)		
=1 if out of labor force (inc retired)	0.124***	0.126***	0.101***
	(0.0164)	(0.0164)	(0.0287)
cohort==born pre-1944		0.0464**	
		(0.0168)	
cohort==born 1944-1952		0.0333**	
		(0.0114)	
cohort==born 1953-1960		0.0153	
		(0.0102)	
state==Unknown State		-0.0612	-0.0506
		(0.0635)	(0.0633)
state==Alabama		-0.0724	-0.0576
		(0.0596)	(0.0605)
state==Arizona		0.0136	0.00742
		(0.0587)	(0.0597)
state==Arkansas		-0.0700	-0.0831
		(0.0575)	(0.0581)
state==California		-0.0429	-0.0376
		(0.0560)	(0.0566)
state==Colorado		0.00951	-0.0129